

ABSTRACT OF THE DISCLOSURE

**[0038]** A system and method for performing joint trellis coded modulation (TCM) with multi-circular constellations on data being transmitted over nonlinear channels without incurring substantial losses in transmission power. The system and method each employs a first constituent encoder, such as a convolutional encoder, adapted to encode the data to output first encoded data, an interleaver, adapted to interleave the data to produce interleaved data, and a second constituent encoder, such as a convolutional encoder, adapted to encode the interleaved data to output second encoded data. The system and method each further employs a modulator, adapted to modulate the first and second encoded data in accordance with modulation symbols mapped in a multi-circular constellation, to reduce power loss during transmission of the modulated first and second encoded data over a non-linear channel. The multi-circular constellation can includes two concentric circles, each having different radii, with a number of the symbols in one of the circles being different from a number of the symbols in the other circle. The system and method each further employs a deinterleaver, adapted to deinterleave the second encoded data after the second encoded data has been modulated by the modulator, and a puncturer, adapted to puncture the first and second modulated encoded data.